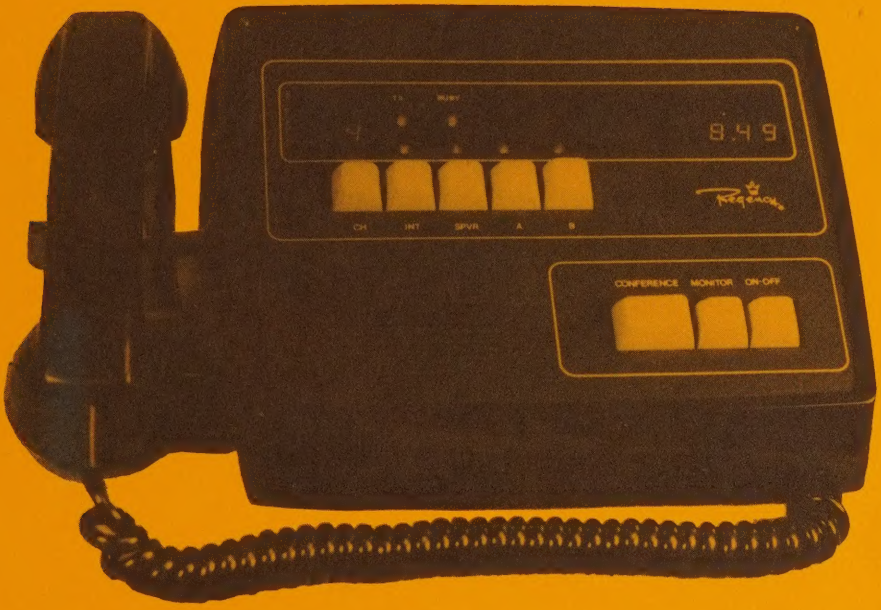
Regency COMMUNICATIONS INC.

INSTRUCTION MANUAL



DIGITAL TONE REMOTE SYSTEM

MODEL MA 312 MA 313

1227 S. PATRICK DR.
SATELLITE BEACH, FLA.

7001-4214-600

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How To Use This Manual

The product described herein is a departure from the standards which have been set by the two-way communications industry during the past several years.

Today's Homo sapien contacts a myriad of electronic products from pocket calculators to automatic bank tellers which have resulted from recent quantum leaps in technology. Despite their increased complexity, these products have achieved acceptance because of the ability of their operators to learn how they work.

The Regency Digital Tone Remote System is yet another of these products.

In compiling this manual, the philosophy used is that it would be better to give too much information than not enough. Consequently, although this manual was written to help the operator to learn to use the system, it also may be used as a primer for the service technician.

Sections three through nine are of primary interest to the everyday user. Other sections may be omitted by the user depending upon his or her curiosity. Persons involved in sales or service should be totally familiar with the complete manual.

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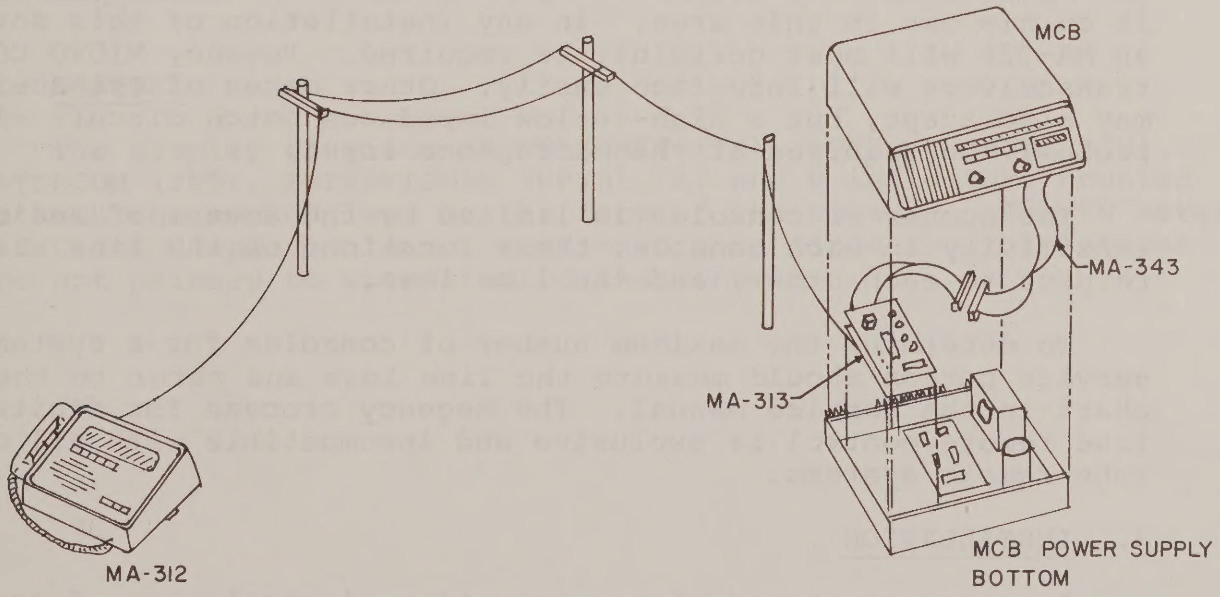
1. INTRODUCTION

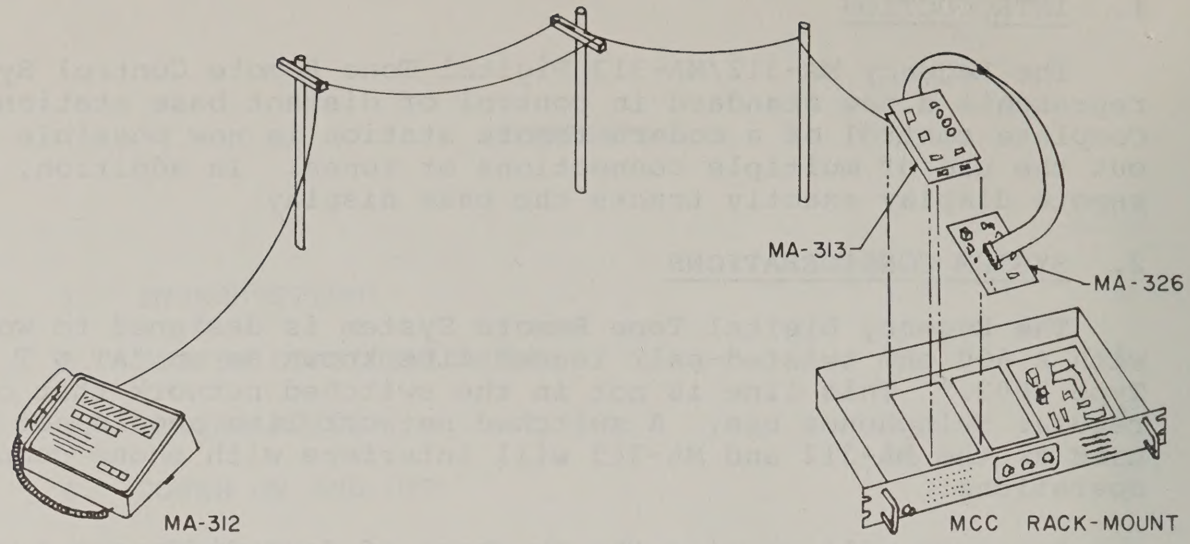
The Regency MA-312/MA-313 Digital Tone Remote Control System represents a new standard in control of distant base stations. Complete control of a modern remote station is now possible without the use of multiple connections or tones. In addition, the remote display exactly tracks the base display.

2. SYSTEM CONSIDERATIONS

The Regency Digital Tone Remote System is designed to work with a 600 ohm twisted-pair leased line known as an "AT & T Type 2002." This line is not in the switched network that our regular telephones use. A switched network line should not be used as the MA-312 and MA-313 will interfere with phone company operations.

A system will require the purchase of four different types of equipment: 1) at least one MA-312 desk console, 2) one MA-313 line terminal assembly, 3) either one MA-326 or one MA-343 terminal adapter, and 4) a base station transceiver. The MA-343 is a wire kit used for direct connection of the MA-313 to the MICRO COM base transceivers (MCBU, MCBH, MCBL) only.





The MA-326 is an adapter board and wire kit designed to interface the MCC rack-mount base transceivers to the MA-313.

The MA-326 transfers some control of the base station to the cabinet interior from the front panel. This limits use of the transceiver to service personnel only.

The Regency Digital Tone Remote System was designed for use with MCB and MCC rack-mount base stations only. Modification for use with other base stations may be possible but the service person is on his own in this area. In any installation of this sort, an MA-326 will most certainly be required. Regency MICRO COM transceivers will interface easily. Other makes of transceivers may also adapt, but a high-to-low impedance match circuit will probably be required at the microphone input.

The number of consoles is limited by the amount of audio sensitivity in each console, their locations on the line with respect to each other, and the line loss.

To determine the maximum number of consoles for a system, the service person should measure the line loss and refer to the chart in the service manual. The Regency process for digital tone remote control is exclusive and incompatible with all other tone remote systems.

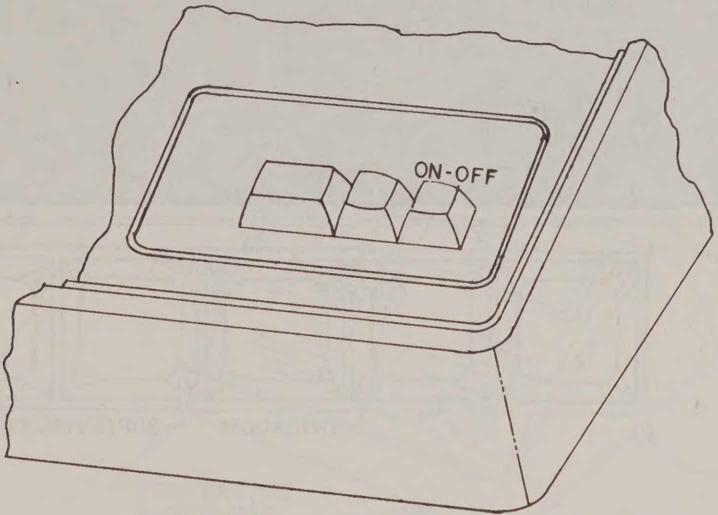
3. INSTALLATION

In order to assure proper operation, installation of any or all components of the MA-312/MA-313 system should be performed only by qualified service personnel in strict adherence to the service manual.

If the user desires to unplug a console from the power socket, this should be done by unplugging the wall transformer and not the plug at the rear of the chassis.

4. POWER ON AND OFF

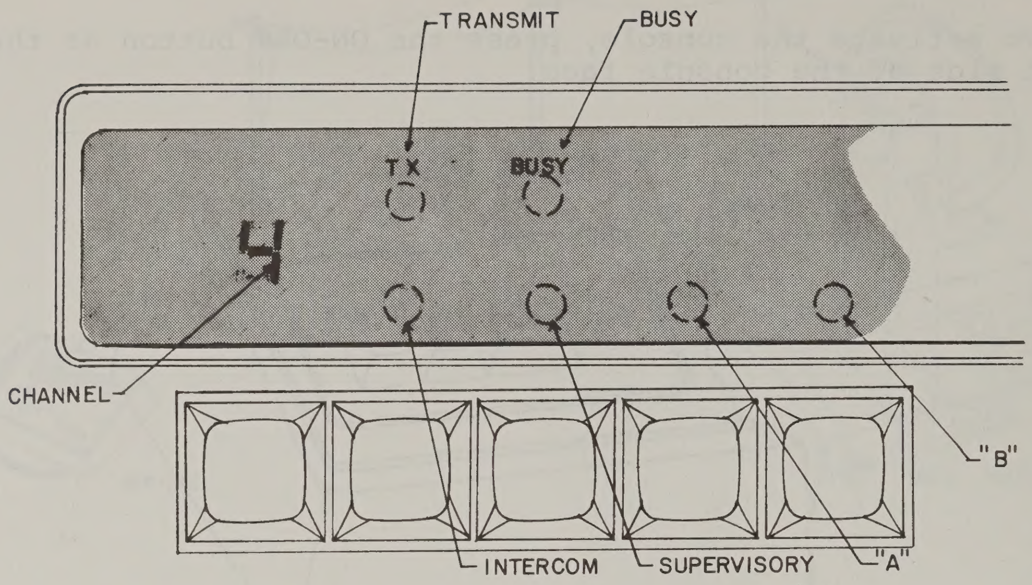
To activate the console, press the ON-OFF button at the lower right side of the console face.



The display may remain unlit for as long as sixty seconds. Note that the clock remains active regardless of the position of the ON-OFF button. The clock may be set or reset while awaiting display lights (refer to Section 8). If desired, it may be verified that power is on by pressing "INT". This will light the lamp directly above the "INT" button.

5. DISPLAY

The display consists of TRANSMIT (TX), BUSY, CHANNEL (CH), INTERCOM (INT), SUPERVISORY (SPVR), A, and B indicators mounted beneath the smoked lens on the face of the console. The VU Meter and Clock displays are not mentioned here since their functions are not primary to operation of the console.



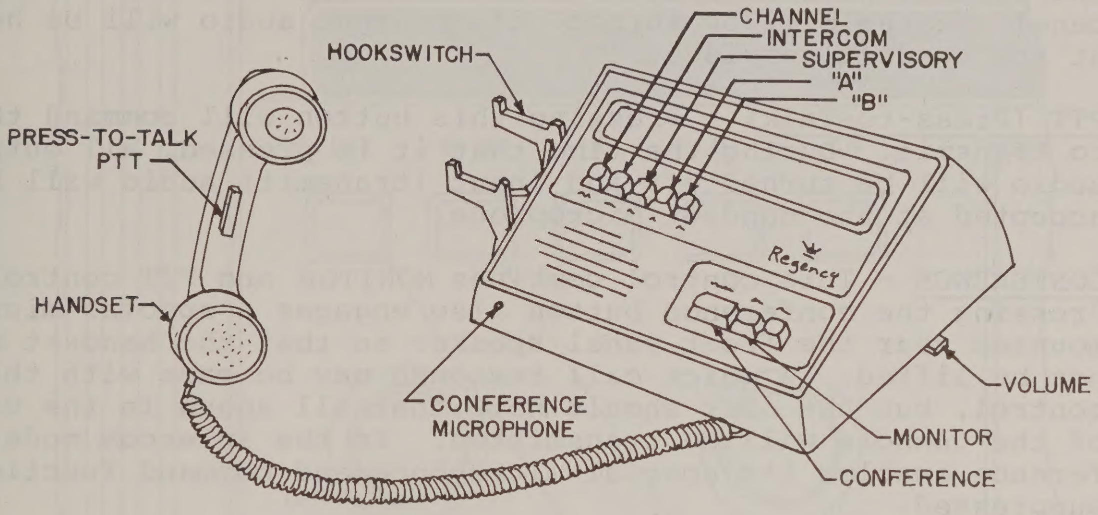
Note that the location of CHANNEL, INTERCOM, SUPERVISORY, A, and B displays lie directly above their related control buttons. INTERCOM and SUPERVISORY (optional) displays are locally controlled and function independently of the base station.

TRANSMIT, BUSY, CHANNEL, A, and B indicators will exactly match those of the base station. If you do not understand the meaning of these displays, an explanation can be found in the base station instruction manual or from your service technician. It should be noted that there are three normal conditions when these five displays may all be blank (unlit). They are: 1) the ON-OFF switch is in the "OFF" position, 2) the console has been turned on within the past minute and it has not received information from the base station yet, and 3) more than one console is in use in the system and another console has control of the base station causing momentary blank displays. An erratic or incorrect display may be caused by: 1) another console is using the base station and momentary erratic displays may result or 2) the base station is turned off (for instance, CH#3, A and B are on with an MCBU).

INTERCOM and SUPERVISORY indicators are locally controlled displays which are on when the related function has been engaged. Refer to the Controls Section for the meaning of these functions.

6. CONTROLS

The console has a number of controls which in some way modify either the operation of the base station or the console itself. The controls are classed as Command Controls, Local Controls, and Combinational Controls.



Command Controls

a. MONITOR - This is the most important command control. The console must be in the monitor mode in order for the other command controls to work. When it is engaged, by pushing the button down, the console attempts to obtain control of the base station. This attempt will fail if: 1) the base station is under the control of another console, 2) the base station microphone is in the monitor mode or unplugged, or 3) the base station is in the supervisory mode. If you fail to obtain control of the base station, you may remain in the monitor mode until control of the base station is relinquished by the other operator through reversal of situation 1, 2 or 3. Only one console may do this as the system can tolerate no additional consoles on its waiting list.

Monitor can have additional functions if certain options are installed in the base station. The monitor command button will control these options in exactly the same manner as the monitor control on the base station microphone.

b. CHANNEL (CH) - Pressing this button will advance the channel once. Allow one and one half seconds between each channel advance command.

c. "A" AND "B" - These are used to control any options which may be installed in the base station. These controls are limited in OFF-to-ON and ON-to-OFF cycle time to about one and one half seconds. They are also used to set the clock (see Section 8).

Combination Controls

a. HOOKSWITCH - This control combines the MONITOR command control with a speaker switch. When the hookswitch is held down by the weight of the handset, the console will not be in the monitor mode unless the MONITOR or CONFERENCE controls are engaged. Any incoming audio will be heard through the front panel speaker. If the handset is lifted off of the hookswitch, the console will be placed in the monitor mode, and the front panel speaker will be turned off. Output audio will be heard at the handset earpiece.

b. PTT (Press-to-Talk) - Pressing this button will command the base to transmit. During the time that it is pressed, all output audio will be turned off and input (transmit) audio will be accepted at the handset microphone.

c. CONFERENCE - This control combines MONITOR and PTT controls. Pressing the conference button also engages a special microphone mounted near the front panel speaker so that the handset need not be lifted. A quick call response may be made with this control, but the user should note that all sound in the vicinity of the console will be transmitted. In the intercom mode, conference enables its special microphone and command functions are suppressed.

Local Controls

a. VOLUME - This sliding control adjusts output audio level from the front panel speaker, auxiliary speaker and earpiece. To increase the volume, slide it toward the rear of the console.

b. INTERCOM (INT) - When this function is engaged, as indicated by an illuminated lamp above the button, all command functions are suppressed. This allows communication between other consoles also in the intercom mode.

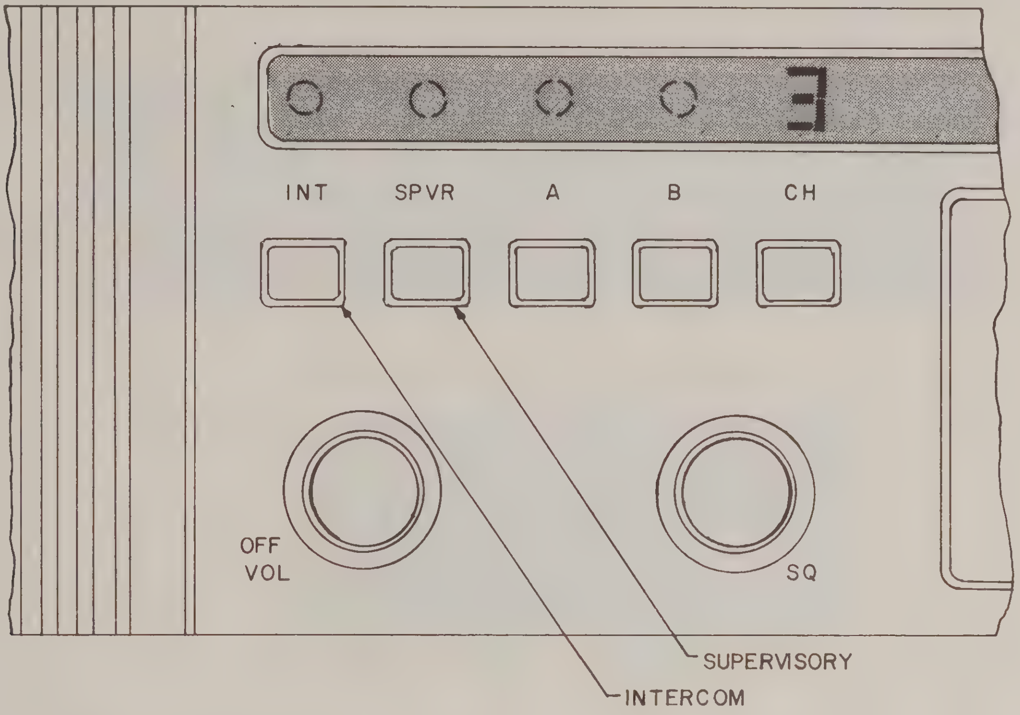
c. SUPERVISORY (SPVR) - This is an optional control which is inert in consoles as delivered. If this function is desired, your service person may activate it by cutting a jumper inside the console. A system may have only one supervisory console.

When console supervisory is engaged, as indicated by an illuminated lamp above the button, all other remote consoles will have their command functions disabled and the supervisory remote will take over control. In fact, a remote in the supervisory mode can even over-ride the base station if it is in local use providing the base is not in the supervisory mode.

The SPVR button is also used to set the clock (see Section 8).

Base Controls

The base station has two controls which are specifically designed for use with the MA-312/MA-313 remote control system. These are called Supervisory and Intercom. Although these are named the same as two of the local controls on the remote console, they are much more powerful since local base station control is of the highest priority.



a. SUPERVISORY(SPVR) - Engaging this control, as indicated by an illuminated lamp above the button, disconnects all control inputs coming from the remote system. In this state, the base may operate under its ordinary local control.

b. INTERCOM (INT) - When engaged, as indicated by an illuminated lamp above the button, this control: 1) disables all control inputs coming from the remote system, 2) disables the base transmitter, and 3) opens a two-way intercom channel between the base and the remote consoles.

7. AUDIO

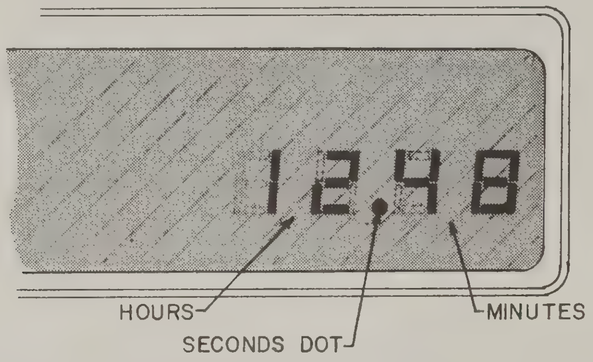
Speech paths within the remote system are straightforward and fairly obvious once the basics of the control system are understood. The biggest stumbling block in understanding the audio routing is the intercom-busy lamp relationship.

The busy lamp on the base station is connected to a preset circuit which detects the presence of a received signal. When a signal is received, the busy lamp will turn on until the transmission is concluded. Remote busy lamps will correspondingly turn On and Off. The audio output of each remote console will engage only when the console busy lamp is illuminated. Thus, the console will usually be silent until a signal is received by the base station.

Intercom functions also turn on the remote console audio output. If the intercom is engaged at the console, the audio output is simply turned on with no special display indication. However, engaging the Intercom function at the base station turns on all of the remote busy lamps and, of course, audio outputs. Base station receiver audio output will be superimposed on all intercom conversations unless the base station is in the intercom mode.

With the base in the intercom mode, its speaker broadcasts both receiver audio and intercom conversation. Remote consoles in the intercom mode monitor the line and may listen in to both sides of any remote or intercom conversation taking place.

8. CLOCK - The MA-308 clock is mounted on the right side of the MA-312 console with its four display digits visible in the smoked lens. The clock will remain on regardless of the position of the ON/OFF button.



The display shows hours and minutes and has a dot which blinks one time per second. If the entire display blinks, the 110 VAC power supply has been interrupted since the clock was last set and the time displayed cannot be trusted.

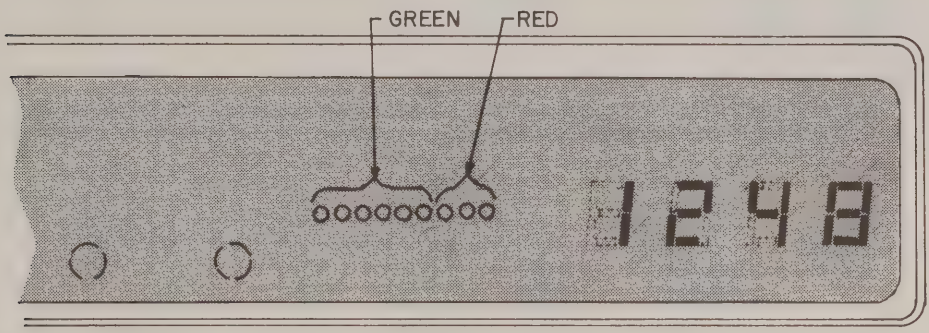
Set the clock as follows:

1. Turn on the remote by depressing the ON-OFF button.
2. Set the hours by entering the "FAST-SET" mode. To do this, press "SPVR" and "A" simultaneously. When the desired hourly time is reached, exit the "FAST-SET" mode by releasing first "SPVR" and then "A".
3. Set the minutes by entering the "SLOW-SET" mode. To do this, press "SPVR' and "B" simultaneously. When the desired time is reached, exit the "SLOW-SET" mode by releasing first "SPVR" and then "B".

If desired, the MA-308 may be converted to a 24-hour configuration (i.e. 1:00 P.M. = 13:00). To obtain this feature contact your service person.

9. VU METER

The VU Meter display consists of six green and three red LEDs visible to the left of the clock display.

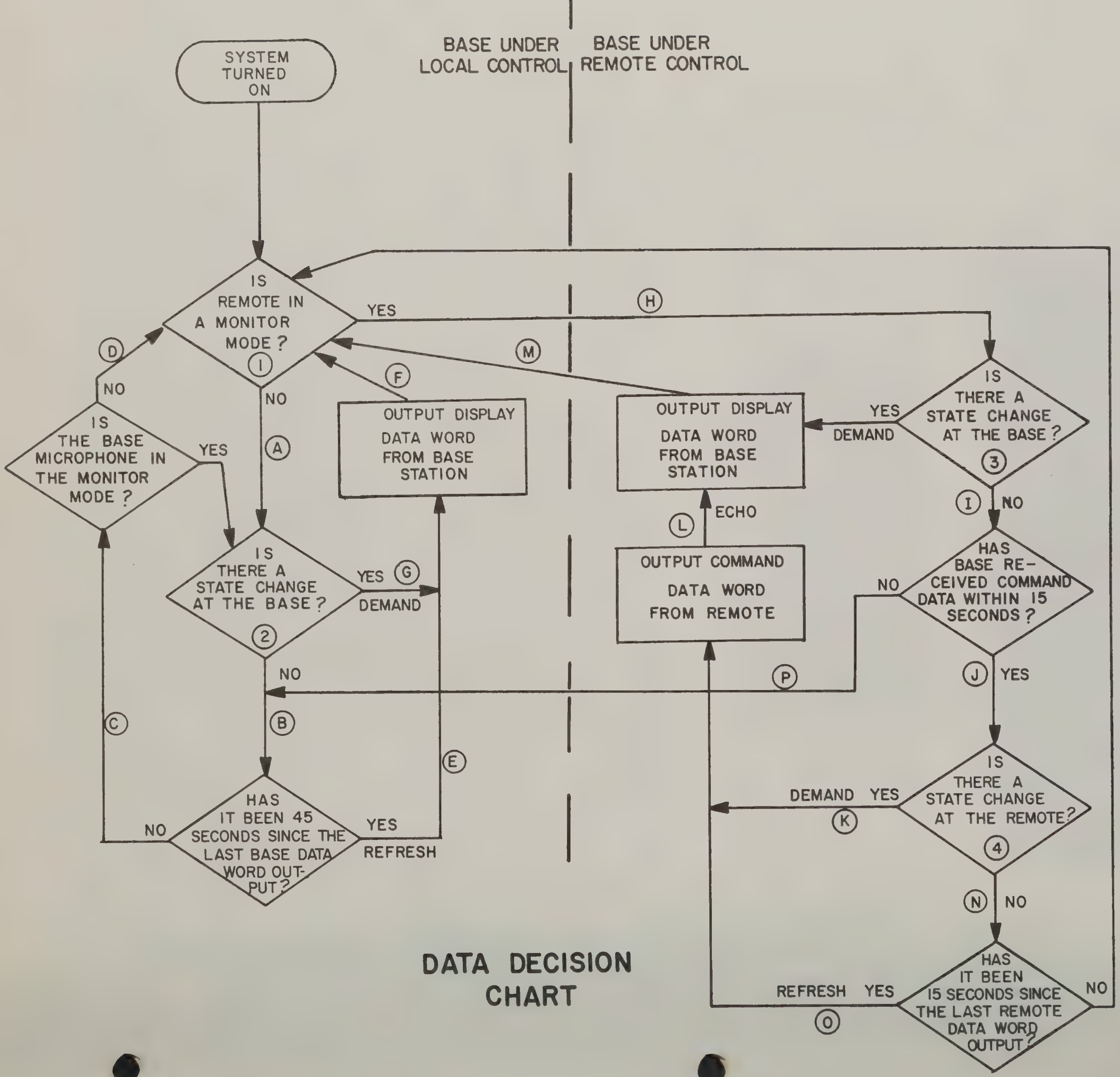


The meter is used to display the relative amplitude of audio on the transmission line. The LEDs remain unlit until audio is received. With increasing audio level, the LEDs begin to light from left to right one at a time until all of the green LEDs are illuminated. At still higher audio levels, the red LEDs begin to light in a similar fashion. Normal conversation will result in a flickering display. When transmitting, the VU Meter may be used to gauge your voice amplitude. A perfect speech level should light the red LEDs occasionally. The VU Meter does not indicate actual modulation of the base station, but is a representative display.

10. OPERATIONAL THEORY

To make the base station respond to the remote control consoles and to display the base station status on the consoles, the consoles and base must carry on an electronic conversation. This conversation is made up of small packages of information called data words. These data words share the same audio path that is used for human speech. However, they are so short that they take up less than a syllable. If the base station is inactive and your console is placed in the intercom mode, you will hear a click about every forty-five seconds and see a jump of the VU Meter. This indicates the presence of a data word coming from the base station.

Since the base and remotes speak the same language, it is conceivable that a remote could get confused when it monitors a group of data words in a conversation between another remote and the base. For example, the idle remote may think that a command from the active remote to "turn on the transmitter" means "display channel 4". To avoid this, the data words contain additional information to indicate their source. The idle remote detects this and for a moment, blanks its display rather than show bogus information. A remote and base do not communicate constantly. If they did, human speech on the shared audio path would be obliterated. A compromise system has been devised which will minimize data communication yet retain solid system control. In this system, data is transmitted from the base to the remote consoles or vice-versa as shown in the data decision chart.


BASE UNDER LOCAL CONTROL
BASE UNDER REMOTE CONTROL
SYSTEM TURNED ON
IS REMOTE IN A MONITOR MODE ? ①
YES
NO
Ⓐ
Ⓗ
IS THE BASE MICROPHONE IN THE MONITOR MODE ?
NO
Ⓓ
YES
IS THERE A STATE CHANGE AT THE BASE ? ②
YES
Ⓖ
DEMAND
NO
Ⓑ
OUTPUT DISPLAY DATA WORD FROM BASE STATION
Ⓕ
Ⓜ
HAS IT BEEN 45 SECONDS SINCE THE LAST BASE DATA WORD OUTPUT?
NO
Ⓒ
YES
REFRESH
Ⓔ
IS THERE A STATE CHANGE AT THE BASE ? ③
YES
DEMAND
OUTPUT DISPLAY DATA WORD FROM BASE STATION
Ⓛ
ECHO
OUTPUT COMMAND DATA WORD FROM REMOTE
Ⓘ
NO
HAS BASE RECEIVED COMMAND DATA WITHIN 15 SECONDS ?
NO
Ⓟ
Ⓙ
YES
IS THERE A STATE CHANGE AT THE REMOTE? ④
DEMAND
YES
Ⓚ
Ⓝ
NO
HAS IT BEEN 15 SECONDS SINCE THE LAST REMOTE DATA WORD OUTPUT?
REFRESH
YES
Ⓞ
NO

DATA DECISION CHART

NOTES:

① A MONITOR MODE IS MONITOR, CONFERENCE, OR OFF-HOOK CONDITIONS.

② A STATE CHANGE IS WHEN ANY OF THE FOLLOWING DISPLAYS CHANGE.

BUSY
TRANSMIT
CH
A
B
SPVR
INT

OR MONITOR BUTTON ON THE MICROPHONE IS PRESSED.

③ SAME AS NOTE ② EXCEPT FOR MONITOR BUTTON.

④ A STATE CHANGE IS WHEN ANY OF THE FOLLOWING BUTTONS ARE PRESSED:

MONITOR
CONFERENCE
CH
A
B
PTT

OR THE HOOKSWITCH POSITION IS CHANGED.

Let's refer to the chart and imagine a possible scenario between a base and a remote. Early in the morning, when there is no radio traffic, the system is turned on, base first. The remote has its handset on the hook and is not in the monitor mode. The remote display is blank. The system, under local control cycles around the loop formed by branches A,B,C, and D. After about forty-five seconds, the loop A-B-E-F is followed once before returning to loop A-B-C-D. Data is transmitted to the remote which correctly illuminates its display. This data is called refresh data. A mobile station operator checks in and his transmission lights the base "BUSY" lamp. The demand mode (branch G) forces data to be immediately sent to the remote where the remote "BUSY" lamp and speaker audio are turned on. After a short transmission, the base busy lamp goes out, data is again sent because of a pass through loop A-G-F, and the remote BUSY lamp and audio turn off. The system again reverts to loop A-B-C-D.

The remote operator decides to contact the mobile station. He lifts the handset off the hookswitch and command data is sent to the base as the system follows branches H,I,J, and K. Branch K is the demand mode for the remote. The base receives this command and goes into the monitor mode. Since a command data word was received, the base immediately responds with a display data word (echo data). Pressing the PTT results in the same type of communication through loop H-I-J-K-L-M. The mobile operator initiates a fairly long transmission - say thirty seconds in duration. As the remote operator listens, no changes take place and data eminates from the remote about every fifteen seconds as branches N and O are followed (refresh mode). The display is updated every fifteen seconds also because of echo data from the base station.

Finally, let's suppose that the remote operator is in the middle of a transmission when a power failure occurs at the remote location. The base station is designed to anticipate refresh data from the remote (Branch O) and when data fails to appear, it drops out of monitor and transmit modes by following Branch P. In this way, the system returns to the A-B-C-D loop.

11. SPECIFICATIONS

CONSOLE - MA-312

A. Operator controls

1. On/Off Volume
2. PTT
3. Channel Selection
4. Option A Enable/Disable
5. Option B Enable/Disable
6. Tone Monitor/Base Station Capture
7. Intercom
8. Supervisory (Option)

B. Information Display

1. Transmit
2. Channel
3. Option A Condition
4. Option B Condition
5. Busy Channel
6. Supervisory (Option)

7. Local Microphone VU Meter
8. Clock
9. Intercom

C. Power Required - 6W, 110 VAC 50/60 cy less options

D. Telephone Line Required - 600 ohm Audio Grade Balanced Line AT & T Type 2002

E. Data Output - 2600 Hz Tone Pulse Modulated With 12-Bit Data Word

F. Data Input - 2600 Hz Tone Pulse Modulated With 12-Bit Data Word

G. Display Response: PTT - 160ms max.; CH.,A,B - 100ms max.

H. Maximum Control Repetition Rate: PTT - 1.0 sec.; CH.,A,B - 1.5 sec.

I. Data Refresh Cycle Period - 15 sec. nominal

J. Audio Power Output - 2W min.

K. Line Power Out - 8dBm min.

L. Tone Sensitivity - 100mv max.

M. Size - 12¼" W x 7½" L x 4½" H (31cm W x10cm L x 11cm H)

N. Weight - 3¼ lbs. desk set, 1¼ lbs. power supply (mass - 1.5 kg desk set, 0.6 kg power supply)

PANEL - MA-313

A. Information Input

1. PTT
2. Channel
3. Option A Condition
4. Option B Condition
5. Busy Channel
6. Tone Monitor/Base Station Capture

B. Information Output

1. Ptt
2. Channel Selection
3. Option A Enable/Disable
4. Option B Enable/Disable
5. Tone Monitor/Base Station Capture

C. Power Required - 60ma @ 13.8 VDC

D. Telephone Line Required - 600 ohm Audio Grade Balanced Line AT & T Type 2002

E. Data Output - 2600 Hz Tone Pulse Modulated With 12-Bit Data Word

F. Data Input - 2600 Hz Tone Pulse Modulated With 12-Bit Data Word

G. Control Response - PTT - 120ms max.; CH.,A,B - 270ms max., Mon - 400ms max.

H. Data Refresh Cycle Period - 45 sec. nominal

I. Line Power Out - 8dBm min.

J. Tone Sensitivity - 100mv max.

K. Size - 2 7/8" W x 7 1/4" L x 1 3/8" H
(7.3cm w x 18.4cm L x 3.5cm H)

L. Weight - 1/2 lb. (mass - 230 gm)

RACK MOUNT ADAPTER - MA-326

A. Service Controls

1. Channel Selection
2. Option A Enable/Disable
3. Optio B Enable/Disable
4. Intercom
5. Supervisory
6. Busy Channel Squelch Level

B. Remote Control Inputs

1. PTT
2. Tone Monitor/Base Station Capture
3. Channel Selection
4. Option A Enable/Disable
5. Option B Enable/Disable

C. Power Required - 300ma max. @ 13.8 VDC

D. Size - 2 7/8" W x 7 1/4" L x 1 1/4" H
(7.3cm W x 18.4cm L x 3.2cm H)

E. Weight - 4½ ozs. (mass - 125gm)

12. GLOSSARY/INDEX

"A" - One of two controls to be used with options installed in the base station. May refer to an associated display. Pages 3,4,5,8.

Active Remote - The remote console which is controlling the base station at a given time. Page 9.

Adapter - A device used to link a given system with an alien system. Examples: Impedance Matcher, MA-326. Pages 1,2.

"B" - A control function or display similar to "A". Pages 3,4,5,8.

Balanced Line - A set of conductors having equal resistances per unit length and equal impedances to ground and other circuits. A twisted pair of wires. Pages 1,12.

Base - Base station.

Base Station - The radio transceiver portion of a system.

Busy - 1) A display lamp on the base station which indicates the presence of a signal on the receive channel.

2) A display lamp on the remote console which lights in unison with the base busy lamp. This turns on the console audio output. Pages 3,7,8.

Capture (of base station) - Occurs when a base station recognizes that a remote console is controlling it.

Channel (CH) - The seven-segment display or corresponding control used to change radio frequencies. This display/control is both local and remote. Pages 3,5.

Combination Controls - Remote buttons or switches which integrates command controls with each other or with some other function.

Command Controls - Remote buttons which elicit a single response of the base station. Page 5.

Conference - A combination control which uses a chassis mounted microphone. May be used in the Intercom mode. Pages 5,6.

Console - An MA-312 digital remote control console or desk set.

Data Word - An electronic message transferred from a digital transmitter to an appropriate digital receiver. Pages 9,10,11,12.

Demand Data - Data word(s) transmitted when inputs change. Pages 10,11.

Demand Mode - A state entered each time an input changes, requiring the transmission of a data word. Pages 10,11.

Echo Data - Data word(s) transmitted by the MA-313 when a data word is received from a remote. Pages 10,11.

Echo Mode - A state entered each time the MA-313 receives a data word from a remote, unless an input changes. Pages 10,11.

Handset - The portion of a remote console which contains transducers for transmitting audio to and receiving audio from the remote system. It has a transmit switch (PTT) and is connected to the console chassis with a coiled cable. Pages 5,6.

Hookswitch - A combined cradle and switch upon which the handset is rested when not in use. When the handset is lifted, the switch disconnects the console speaker and puts the console in the Monitor mode. Pages 5,6.

Idle Remote - A remote functioning as an audio and data receiver only, especially when the base station is captured by another remote. Page 9.

Impedance - The combined resistance, capacitance and inductance of a circuit. Page 2.

Impedance Match Circuit - A circuit needed to couple other circuits which are of different impedances in order to transfer power throughout the required frequency range. Page 2.

Intercom (INT) - 1) A switch which disengages remote control functions in order that the telephone line may be used for conversations between remotes and/or the base station.

2) A display lamp indicating that the base or remote is in the Intercom mode. Pages 3,6,7.

Interface - 1) To connect two different systems together with a special device.

2) To adapt.

3) An adapter.

Page 2.

Leased Line - A pair of wires leased from the telephone company but not in the switched telephone network. They may or may not allow direct currents to pass through them. If they do not, a tone remote (as opposed to a DC remote) must be used. Pages 1,12.

Line Loss - A drop in signal amplitude experienced as the length of the transmission line increases. It may also be caused by natural phenomena acting on the wires. Page 2.

Line Terminal - MA-313 assembly. Also called "Remote Adapter Board: or "Panel". Page 1.

Local Control - Controls independent of any actions at other points in the system. Pages 4,6,7,10,11.

Mode - A state of existence in which a system will respond in a predictable fashion. Pages 5,6,8,9,10,11.

Modulate - To modify a signal in such a way that it conveys information. Pages 9,12.

Monitor - 1) Base local control used with some options.

2) Remote command control which duplicates action of base local monitor control but additionally it is necessary to capture the base station. Page 5.

Refresh Data - Data transmitted periodically if demand or echo stimuli do not exist. Pages 10,11.

Refresh Mode - State seeked by a system with no changing inputs at remote or base locations. Pages 10,11.

Remote - MA-312 digital remote control console or desk set.

Remote Control - A system by which one may have access to radio communication without actually being at the transceiver site.

Sensitivity - A measurement of the ability of a receiver to detect a desired signal. Pages 2,12,13.

Supervisory (SPVR) - 1) A local control used to override other or all remote consoles.

2) A display lamp indicating that the device is in the Supervisory mode.

Pages 3,6,7,8.

Switched Network - The commonly used telephone system. Page 1.

Transmit (TX) - A display lamp used to indicate that the base station is in the Transmit mode. Pages 3,4.

VU Meter - "Volume Unit" Meter. An indicator of audio level. MA-309. Page 9.

NOTES

NOTES

REGENCY COMMUNICATIONS LIMITED WARRANTY

1. This Regency product is warranted to the original or subsequent purchasers to be free of defects in material and workmanship for a period of 90 days from the date of purchase as shown on the original consumer purchaser's receipt.
2. Warranty service will be provided free of charge if the unit is delivered to the Regency authorized service station of original purchase accompanied by original consumer proof of purchase. Any transportation, removal or reinstallation charges will be paid by the purchaser whenever incurred in connection with this warranty. In absence of proof of purchase receipt the warranty period shall be 90 days from the date of manufacture as indicated by serial number on unit. Purchaser need not return the registration card to obtain warranty service.
3. The warranty does not apply to units subject to misuse, neglect, accidents, incorrect wiring not our own, improper installation, or units used in violation of the instructions furnished by us. This warranty excludes any incidental and consequential damages connected with failure or defect in the product.
4. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

CHANGES

The Company reserves the right to modify or change the equipment in whole or in part, at any time prior to delivery in order to include refinements deemed appropriate by the Company, but without incurring any liability to modify or change any equipment previously delivered, or to supply new equipment in accordance with earlier specifications.